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EXAMINER

ILAN, RUTH

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3616

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,916	Applicant(s) YOSHIKAWA ET AL.	
	Examiner Ruth Ilan	Art Unit 3616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda (JP 11-268656 A) in view of Sayko et al. (US 6,450,284 B1) and further in view of JP 63-107135 (referenced in this action as the '135 document). The Examiner has additionally relied on the attached machine language translation of Ueda (See Attachment A.) Ueda teaches (Figures 1 and 2) a forward reverse control system for a work machine including a first forward reverse control means that is a lever (SW-D and associated circuitry) and a second forward reverse control means (SW-F, SW- R and SW-N) and a switching instruction means (SW-J) for instructing a switch from a first control state in which the control is performed by the first control means to a second control state in which the control is performed by the second control means. A control means for controlling the work machine in accordance with the first or second forward reverse control means or the switching control means (see circuit of Figure 2) is also provided. As described in paragraph [0016] of the attached machine language translation and also on page 4 of the instant application in a description of the prior art, when the first forward/reverse control means is operated (switched from neutral) the second control state is cancelled to return to the first control state. Ueda as amended

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differs from the claimed invention because the second forward reverse control means is located on the lever, not disposed in the vicinity of but not on the control lever. Ueda does teach that it is known to include switches located proximate to the control lever (SW-J.) Additionally Sayko et al. teaches that it is known to include a variety of switches located proximate to the control lever (26,28 and drive mode switch 29) see Figure 2. Because both Ueda and Sayko et al. teach control arrangements for work vehicles, it would have been obvious to one having ordinary skill in the art to substitute one location for the other to achieve the predictable result of controlling the work machine.

Additionally, there are a finite number of locations for operator access of the second forward reverse control means, and Sayko teaches that one of these finite number of control switches is proximate, but not on a control lever. Thus it would have been obvious to a person of ordinary skill in the art to try the location of Sayko because a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. The combination of Ueda and Sayko differs from the claimed invention in that it does include cancellation instruction means in addition to the first forward/reverse control means. The '135 patent teaches cancellation means (46, see Figure 6) for the second control state of a work machine. It would have been obvious to one having ordinary skill in the art at the time of the invention to include a cancellation means in addition to the first forward/reverse control means of Ueda, as taught by the '135 reference, in order to provide for an failsafe override of the second control means so that the operator can avoid inadvertent motion of the machine.

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3. Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda (JP 11-268656 A) in view of Sayko and JP 63-107135 (referenced in this action as the '135 document) and further in view of Fought (US 4,700,802.) Regarding claim 2, the combination of Ueda in view of '135 and Sayko differs from the claimed invention because the second forward/reverse control means of Ueda is a series of three buttons, rather than a control member that can be shifted to a forward, reverse and neutral position. Fought teaches that it is known to provide the type of control member claimed (78.) Because both Ueda and Fought teach a second forward/reverse control for a work vehicle it would have been obvious to one having ordinary skill in the art at the time of the invention to substitute the control member of Fought in the machine of Ueda to obtain the predictable result of shifting from forward and reverse.

4. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda (JP 11-268656 A) in view of Sayko, and JP 63-107135 (referenced in this action as the '135 document) and Fought (US 4,700,802) and further in view of Koga (US 5,109,945.) The combination of Ueda, the '135 reference Sayko and Fought is discussed above, and does not disclose a use determining means that is an occupancy detection means for determining whether or not an operator is in occupancy of the seat. It is well know in the work vehicle art to include such a device, in order to avoid motion of the vehicle when the operator leaves the seat, even if the shift device is operated. Koga teaches such a device (seat switch 1) that is used to avoid motion even if a shift device is operated (see col. 2, lines 53-67.) It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the combination of Ueda in

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view of '135 and Fought to include an occupant detection means as taught by Koga in order to avoid motion when the occupant is not seated, so as to avoid injuring the operator.

Response to Arguments

5. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ruth Ilan whose telephone number is 571-272-6673.

The examiner can normally be reached on Monday-Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Dickson can be reached on 571-272-7742. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ruth Ilan
Primary Examiner
Art Unit 3616

/Ruth Ilan/
Primary Examiner, Art Unit 3616
w/ Attachment A

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Attachment A – Machine Language translation of JP 11-268656 A.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]Specifically, this invention relates to the pre-sternway switch circuit of work vehicles, such as a wheel loader to which either by the side of a handle and a work lever enabled it to perform a pre-sternway change (advance selection or sternway selection), about the pre-sternway switch circuit of a work vehicle.

[0002]

[Description of the Prior Art]Drawing 3 is a side view showing an example of a wheel loader. As shown in the figure, the wheel loader 1 runs by the wheel 2 (advance or sternway), and it has the cab 3 in a body center section, and has a work machine which equips a car body front with the bucket 5 formed at the tip of the arm 4 and the arm 4. And in this wheel loader 1, loading of the earth and sand to a track, etc., etc. are performed by authorized personnel's run operation in the cab 3 performing the advancing travel or reverse running of vehicles, and performing rise and fall and the tilt of the bucket 5, and dumping by work operation.

[0003]Drawing 4 is a perspective view showing the important section composition in the cab of this wheel loader. As shown in the figure, toward a vehicle front to the left-hand side run operation part 6. The handle (steering wheel) 8 provided in the steering post 15, It has the pre-sternway switching lever 10 provided in the left of the handle 8, the engine start switch (key switch) 11 formed in the right of the handle 8, and the accelerator pedal 9 provided in the right-hand side lower part of the handle 10.

[0004]The point of contact of the pre-sternway switching lever 10 constitutes a part of pre-sternway switch circuit (sequential circuit) which is not illustrated, When the pre-sternway switching lever 10 is leaned upwards, advance is chosen, when the pre-sternway switching lever 10 is a horizontal position (state of a graphic display), it is neutral, and sternway is chosen when the pre-sternway switching lever 10 is leaned downward. The knob 12 is attached to the handle 8, authorized personnel can hold this knob 12 single hand, and the handle 8 can be rotated now.

[0005]On the other hand, the right-hand side work operation part 7 is equipped with the work machine lever 13 toward the vehicle front. And the upper part or a lower part can be made to rotate the bucket 5 by descended or raising the bucket 5 and leaning the work machine lever 13 to the left or the right, when authorized personnel hold the head 14 and a front stirrup leans the work machine lever 13 back now (a tilt or dumping).

[0006]Therefore, when this wheel loader 1 performs loading to a track, etc., authorized personnel hold the head 14 with the right hand, lean the work machine lever 13 all around, perform work operation, simultaneously, they can hold the knob 12 with the left hand, can turn the handle 12, and can also perform run operation.

[0007]

[Problem(s) to be Solved by the Invention]However, in the above-mentioned conventional wheel loader 1, the work machine lever 13 was operated with the right hand, simultaneously, while operating the handle 12 with the left hand, when a pre-sternway change was performed, its hold of the handle 8 had to be released and the pre-sternway switching lever 10 once had to be operated.

[0008]Then, some work vehicles, such as a wheel loader, have these days some which formed the pre-sternway change-over switch in the work machine lever side, in order to raise the

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operativity of a pre-sternway change (refer to drawing 1).

[0009]However, if it enables it to carry out a pre-sternway change (only by pushing if it is a push-button switch) only by operating the pre-sternway change-over switch by the side of a work machine lever, Since a work machine lever is operated frequently, it has a possibility that a pre-sternway change-over switch may be accidentally operated during operation of this work machine lever. That is, a pre-sternway change will be carried out accidentally and there is a possibility that vehicles may move forward or go astern suddenly.

[0010]In completing loading work and shifting from work operation to run operation, even if the work machine lever side has a pre-sternway change-over switch, as for authorized personnel (especially skilled authorized personnel), the way which performed the pre-sternway change by the pre-sternway switching lever by the side of the familiar handle, Operation can be performed smoothly.

[0011]When the pre-sternway change-over switch formed in the work machine lever side is an individual switch like a push-button switch, there are (referring to drawing 1) and a possibility that a shock may occur with this change if an advance switch or a sternway switch is only pushed and it can be made to perform a pre-sternway change.

[0012]Therefore, this invention makes it the 1st technical problem to provide the pre-sternway switch circuit of the work vehicle which can prevent a pre-sternway change from being performed by the operation mistake of the pre-sternway means for switching provided in the work operation part in view of the above-mentioned conventional technology.

[0013]When pre-sternway selection by the pre-sternway means for switching of a work operation part is performed previously, let it be the 2nd technical problem to provide the pre-sternway switch circuit of the work vehicle over which priority can be given to the pre-sternway change by the pre-sternway means for switching of a run operation part.

[0014]Let it be the 3rd technical problem to provide the pre-sternway switch circuit of the work vehicle which can prevent generating of the shock accompanying this change at the time of the pre-sternway change by the pre-sternway means for switching of a work operation part.

[0015]

[Means for Solving the Problem]A pre-sternway switch circuit of a work vehicle of the 1st invention that solves the 1st technical problem of the above, Before [1st] providing in a run operation part, it is a pre-sternway switch circuit of a work vehicle which has a sternway switching operation means and the sternway switching operation means before [2nd] providing in a work operation part, When it had a selecting switch for choosing said 2nd front sternway switching operation means, and said 1st front sternway switching operation means was neutral and turned ON said selecting switch, it constituted so that a pre-sternway change by said 2nd front sternway switching operation means could be performed.

[0016]A pre-sternway switch circuit of a work vehicle of the 2nd invention that solves the 2nd technical problem of the above, In a pre-sternway switch circuit of a work vehicle of the 1st invention, after advance or sternway is chosen by said 2nd front sternway switching operation means, When a pre-sternway change by said 1st front sternway switching operation means was performed, pre-sternway selection by said 2nd front sternway switching operation means was canceled, and it constituted so that a pre-sternway change by said 1st front sternway switching operation means could be performed.

[0017]A pre-sternway switch circuit of a work vehicle of the 3rd invention that solves the 3rd

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technical problem of the above, It is what consists of an advance switch with said 2nd front sternway switching operation means individual in a pre-sternway switch circuit, a sternway switch, and a neutral switch of a work vehicle of the 1st or 2nd invention, A pre-sternway change by said advance switch or said sternway switch was constituted so that it could carry out once canceling sternway selection by said sternway switch, or advance selection by said advance switch by operating said neutral switch.

[0018]

[Embodiment of the Invention] Hereafter, an embodiment of the invention is described in detail based on a drawing. In order that this invention may devise to the pre-sternway switch circuit of a work vehicle, below, it explains this point in detail and omits explanation and a graphic display as being the same as the overall composition, therefore former (refer to drawing 3) of a work vehicle.

[0019][Embodiment 1] The perspective view and drawing 2 in which the important section in the cab of the wheel loader provided with the pre-sternway switch circuit which drawing 1 requires for an embodiment of the invention is shown are a lineblock diagram of said pre-sternway switch circuit.

[0020] As shown in <composition> drawing 1, toward a vehicle front to the left-hand side run operation part 21. The handle (steering wheel) 23 provided in the steering post 26, Before [1st] being provided in the left of the handle 23, it has pre-sternway switching lever SW-D which is a sternway switching control means, engine start switch (key switch) SW-S provided in the right of the handle 23, and the accelerator pedal 25 provided in the right-hand side lower part of the handle 23.

[0021] The point of contact of pre-sternway switching lever SW-D constitutes a part of pre-sternway switch circuit (detailed after-mentioned), When pre-sternway switching lever SW-D is leaned upwards, advance is chosen, when pre-sternway switching lever SW-D is a horizontal position (state of a graphic display), it is neutral, and sternway is chosen when pre-sternway switching lever SW-D is leaned downward. The knob 24 is attached to the handle 23, authorized personnel can hold this knob 24 single hand, and the handle 23 can be rotated now.

[0022] On the other hand, the right-hand side work operation part 22 is equipped with the multifunction lever 27 toward the vehicle front. This multifunction lever 27 has the function and pre-sternway switching function as a conventional work machine lever (refer to drawing 4).

[0023] Namely, when authorized personnel hold the head 28 and a front stirrup leans the multifunction lever 27 back like the conventional work machine lever, a bucket (refer to drawing 3) is descended or raised, The upper part or a lower part can be made to rotate a bucket by leaning the multifunction lever 27 to the left or the right now (a tilt or dumping).

[0024] And advance switch SW-F, neutral switch SW-N, and sternway switch SW-R are further provided in the head 28 of the multifunction lever 27 as a pre-sternway change-over switch which is the 2nd front sternway switching control means. Near the multifunction lever 27, selecting-switch SW-J for choosing this pre-sternway change-over-switch SW-F, SW-N, and SW-R is provided. These switch SW-F, SW-N, SW-R, and SW-J also constitute a part of pre-sternway switch circuit. It is the things of a push button type, and while pushing with the finger, when a point of contact closes each of these switch SW-F, SW-N, SW-R, and SW-J (set to ON) and a finger is released, it is the things of the structure which returns by spring force and a point of contact opens (come by off).

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[0025]Here, based on drawing 2, the composition of a pre-sternway switch circuit (sequential circuit) is explained.

[0026]As shown in drawing 2, the terminal B of engine start switch SW-S is connected to the power supply buses 31 of 12V, and the terminals M and S are connected to terminal B₁ of pre-sternway switching lever SW-D, and B₂ via the cables (harness) 33 and 34, respectively. When engine start switch SW-S is turned and it is made ON positions, the terminal B and the terminal M are connected, and when a start position is used, the terminal B, the terminal M, and the terminal S are connected. If its hold is released after making engine start switch SW-S into a start position, it will return to ON positions.

[0027]It is connected to the one end side of run pump advance solenoid SOL1 and relay R₁₀ via diode D₄, respectively, and, as for the other end side of this run pump advance solenoid SOL1 and relay R₁₀, the terminal F of pre-sternway switching lever SW-D is connected to the ground bus 32. Relay R₈ is also connected between the terminal F and the bus line 32. It is connected to the one end side of run pump sternway solenoid SOL2 and relay R₁₁ via diode D₅, respectively, and, as for the other end side of this run pump sternway solenoid SOL2 and relay R₁₁, the terminal R of pre-sternway switching lever SW-D is connected to the ground bus 32. Relay R₉ is also connected between the terminal R and the bus line 32. Between the terminal N of pre-sternway switching lever SW-D, and the bus line 32, contact R_{7-b1} and the starter motor M of relay R₇ are connected in series.

[0028]The terminal F is connected with terminal B₂, when pre-sternway switching lever SW-D is leaned upwards and it is considered as the advance selected position F, When referred to as neutral position N, the terminal N is connected with terminal B₁, and the terminal R is connected with terminal B₂, when it leans downward and is considered as the sternway selected position R. It is held at each position F, N, or R until authorized personnel do manual operation of pre-sternway switching lever SW-D and switch it to other positions.

[0029]On the other hand, between the cable 34 and the cable 35, selecting-switch SW-J and contact R_{1-a1of relay R1} are connected in parallel, and diode D₁ is connected between selecting-switch SW-J and contact R_{1-a1}.

[0030]Between the cable 35 and the bus line 32, relay R₁, contact R_{8-b1of relay R8}, and contact R_{9-b1of relay R9} are connected to the cathode side of diode D₁ in series.

[0031]The anode side of diode D₁ sets and between the cable 35 and the bus line 32, Sequentially from the left-hand side in a figure, the yellow selection lamp YL, in-series neutral switch SW-N and relay R₂, In-series contact R_{2-b1of advance switch SW-F}, relay R₃, contact point-of-contact R_{6-b1of relay R6}, and relay R₂, In-series contact R_{3-a1} and relay R₄ of relay R₃, In-series sternway switch SW-R, relay R₅, contact R_{4-b1of relay R4}, contact R_{5-a1of contact R2-b2of relay R2} and in-series relay R₅, relay R₆, and relay R₇ are connected to parallel, respectively.

[0032]Diode D₂ is connected between advance switch SW-F and contact R_{3-a1}, and diode D₃ is connected between sternway switch SW-R and contact R_{5-a1}. And contact R_{3-a1} is connected also to run pump advance solenoid SOL1 and relay R₁₀ via diode D₆, and contact R_{5-a1} is connected also to run pump sternway solenoid SOL2 and relay R₁₁ via diode D₇.

[0033]Between the bus lines 31 and 32, parallel contact R_{11-a1of contact R10-a1of relay R10} and relay R₁₁, the parking ***** buzzer BZ, and parking switch SW-P are connected in series.

[0034]What gave a to numerals like contact R_{1-a1} among each of above-mentioned relay contacts is a point of contact closed when a relay is magnetized, and what gave b to numerals like contact

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R₂-b₂ is a point of contact closed when a relay is deenergisation.

[0035]When <an operation and an effect>, therefore the above-mentioned wheel loader perform loading to a track, etc., Authorized personnel hold the head 28 with the right hand, lean the multifunction lever 27 all around, perform work operation, simultaneously, they can hold the knob 24 with the left hand, can turn the handle 23, and can also perform run operation.

[0036]And at the time of this work operation, pre-sternway changeover switch SW-F by the side of the multifunction lever 27, SW-R, and SW-N can perform a pre-sternway change, Although pre-sternway switching lever SW-D by the side of the handle 23 can perform a pre-sternway change at the time of run operation, the priority of this pre-sternway change is specified by the above-mentioned pre-sternway switching circuit. That is, according to the above-mentioned pre-sternway switching circuit, the following operation and effects are acquired.

[0037]First, where pre-sternway switching lever SW-D is set to neutral position N, Since electric power will be supplied to the starter motor M via the cable 33 if engine start switch SW-S is turned and it is made a start position, the engine which the starter motor M does not operate and illustrate starts, and the hydraulic pump which is not illustrated with this engine drives. That is, vehicles will be prevented from the starter motor M operating, and moving forward or going astern suddenly by this if pre-sternway switching lever SW-D is not neutral position N. If a hydraulic pump (run pump) drives, the hydraulic motor which is not illustrated with this hydraulic pump will drive, and a run will become possible.

[0038]Since the series connection of the contact R₇-b₁ is carried out to the starter motor M, also when relay R₇ is magnetized and contact R₇-b₁ is open, the starter motor M does not operate. That is, also when the pre-sternway change-over-switch SW-F [of the multifunction lever 27], SW-R, and SW-N side is on, the starter motor M is kept from operating by magnetizing relay R₇.

[0039]Next, if its hold of engine start switch SW-S is released and engine start switch SW-S becomes ON positions, it will be in the state where electric power is supplied to the pre-sternway switching lever SW-D side or pre-sternway change-over-switch SW-F, SW-R, and SW-N side, via the cable 34.

[0040]If pre-sternway switching lever SW-D is operated and it is made the advance selected position F or the sternway selected position R in this state, run pump advance solenoid SOL1 or run pump sternway solenoid SOL2 will be magnetized, and vehicles will come to move forward or go astern. Simultaneously, relay R₈ or relay R₉ is magnetized, and contact R₈-b₁ or contact R₉-b₁ opens.

[0041]On the other hand, when pre-sternway change-over-switch SW-F by the side of the multifunction lever 27, SW-R, and SW-N perform a pre-sternway change (advance selection or sternway selection), selecting-switch SW-J is pushed first. As a result, if contact R₈-b₁ and R₉-b₁ has closed, in order that relay R₁ may be magnetized and contact R₁-a₁ may close, Electric power comes (a master power supply calls this state an injection state hereafter) to be supplied also to the cable 35 by the side of the anode of diode D₁. Therefore, the pre-sternway selection by pre-sternway change-over-switch SW-F and SW-R is attained.

[0042]However, pre-sternway switching lever SW-D when it depends and advance or sternway is chosen (i.e., when pre-sternway switching lever SW-D is in the advance selected position F or the sternway selected position R), Since relay R₈ or relay R₉ is magnetized and contact R₈-b₁ or contact R₉-b₁ is open, contact R₁-a₁ has been opened without magnetizing relay R₁, even if it pushes selecting-switch SW-J. Therefore, pre-sternway selection by pre-sternway change-over-

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switch SW-F and SW-R cannot be performed.

[0043]Namely, when pre-sternway switching lever SW-D is neutral position N and selecting-switch SW-J is turned ON, As pre-sternway selection by pre-sternway change-over-switch SW-F and SW-R can be performed, he is trying to give priority to the pre-sternway selection by pre-sternway switching lever SW-D over the pre-sternway selection by pre-sternway change-over-switch SW-F and SW-R.

[0044]For this reason, even if a pre-sternway change is not carried out only by pushing pre-sternway change-over-switch SW-F and SW-R and it pushes pre-sternway change-over-switch SW-F and SW-R accidentally during operation of pre-sternway switching lever SW-D, A pre-sternway change can be prevented from being performed by this operation mistake. For this reason, there is no possibility that vehicles may move forward or go astern suddenly.

[0045]After master powering-on state, i.e., point of contact, R_1-a_1 closed and the selection lamp YL has lit up, Since it is held when contact R_1-a_1 closes even if its hold of selecting-switch SW-J is released and selecting-switch SW-J is come by off, a master powering-on state is maintained.

[0046]If advance switch SW-F or sternway switch SW-R is pushed in the state of this master powering on, in order that relay R_3 or relay R_5 may be magnetized and contact R_3-a_1 or contact R_5-a_1 may close, Run pump advance solenoid SOL1 or run pump sternway solenoid SOL2 are magnetized, and vehicles come to move forward or go astern. Even if its hold of advance switch SW-F or sternway switch SW-R is released and advance switch SW-F or sternway switch SW-R is come by off at this time, Since it is held when contact R_3-a_1 or contact R_5-a_1 closes, an advance selective state or a sternway selective state is maintained.

[0047]And if pre-sternway switching lever SW-D is operated and it is made the advance selected position F or the sternway selected position R after pushing advance switch SW-F or sternway switch SW-R in this way and advance-choosing or sternway choosing, In order that relay R_8 or relay R_9 may be magnetized and contact R_8-b_1 or contact R_9-b_1 may open, relay R_1 becomes deenergisation and contact R_1-a_1 opens. For this reason, the advance selection or sternway selection by advance switch SW-F or sternway switch SW-R can be canceled, and pre-sternway selection by pre-sternway switching lever SW-D can be performed now.

[0048]Therefore, when loading work is completed and it shifts from work operation to run operation, authorized personnel can perform a pre-sternway change preferentially immediately by pre-sternway switching lever SW-D by the side of the familiar handle 23. For this reason, authorized personnel can perform operation smoothly.

[0049]Push advance switch SW-F or sternway switch SW-R, and at the time of advance selection or sternway selection ****. If relay R_4 or relay R_6 is magnetized, contact R_4-b_1 or contact R_6-b_1 opens simultaneously and neutral switch SW-N is moreover pushed, Relay R_2 is magnetized and contact R_2-b_1 and contact R_2-b_2 opens.

[0050]For this reason, even if it only carries out sternway switch SW-R noting that I will switch to sternway, when advance switch SW-F is pushed previously and advance selection is made for example, since contact R_4-b_1 is open, relay R_5 is not magnetized, and sternway selection is not made. On the other hand, in order that relay R_2 may be magnetized and contact R_2-b_1 may once open if neutral switch SW-N is pushed before pushing sternway switch SW-R, relay R_3 becomes deenergisation and the advance selection by advance switch SW-F is canceled. Therefore, if sternway switch SW-R is pushed after that, since contact R_4-b_1 has closed at this time, sternway selection can be made. Of course, this is also the same as when sternway selection is previously

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made by sternway switch SW-R and it is going to switch to advance.

[0051]as [perform / namely, / once / by pushing neutral switch SW-N, / the pre-sternway change by advance switch SW-F or sternway switch SW-R / after canceling the sternway selection by sternway switch SW-R, or the pre-sternway selection by advance switch SW-F] -- it is.

[0052]For this reason, since a pre-sternway change is not carried out only by pushing advance switch SW-F or sternway switch SW-R but neutral switch SW-N once cancels pre-sternway selection, a shock can be prevented from occurring with a pre-sternway change.

[0053]If it is going to choose advance or sternway by pre-sternway switching lever SW-D or pre-sternway changeover switch SW-F, and SW-R when parking switch SW-P is operated (i.e., when the parking brake has worked), When relay R₁₀ or relay R₁₁ is magnetized and contact R₁₀-a₁ or contact R₁₁-a₁ closes, authorized personnel are told about the parking ***** buzzer BZ having sounded and the parking brake having worked. For this reason, it can pull and **** can be prevented.

[0054]This invention is widely applicable to various kinds of work vehicles which perform not only a wheel loader but engineering-works work, a construction work, etc.

[0055]

[Effect of the Invention]As mentioned above, as concretely explained with the embodiment of the invention, the pre-sternway switch circuit of the work vehicle of the 1st invention, Before [1st] providing in a run operation part, it is a pre-sternway switch circuit of the work vehicle which has a sternway switching operation means and the sternway switching operation means before [2nd] providing in a work operation part, When it had the selecting switch for choosing said 2nd front sternway switching operation means, and said 1st front sternway switching operation means was neutral and turned ON said selecting switch, it constituted so that the pre-sternway change by said 2nd front sternway switching operation means could be performed.

[0056]Therefore, according to the pre-sternway switch circuit of the work vehicle of this 1st invention, a pre-sternway change is not carried out only by operating the 2nd front sternway switching operation means, Even if it operates the 2nd front sternway switching operation means accidentally during the work operation in a work operation part, a pre-sternway change can be prevented from being performed by this operation mistake. For this reason, there is no possibility that vehicles may move forward or go astern suddenly.

[0057]The pre-sternway switch circuit of the work vehicle of the 2nd invention, In the pre-sternway switch circuit of the work vehicle of the 1st invention, after advance or sternway is chosen by said 2nd front sternway switching operation means, When the pre-sternway change by said 1st front sternway switching operation means was performed, the pre-sternway selection by said 2nd front sternway switching operation means was canceled, and it constituted so that the pre-sternway change by said 1st front sternway switching operation means could be performed.

[0058]Therefore, when according to the pre-sternway switch circuit of the work vehicle of this 2nd invention loading work is completed and it shifts from work operation to run operation, authorized personnel can perform a pre-sternway change preferentially immediately by the sternway-1st before familiar run operation part side switching operation means. For this reason, authorized personnel can perform operation smoothly.

[0059]The pre-sternway switch circuit of the work vehicle of the 3rd invention, It is what consists of the advance switch with said 2nd front sternway switching operation means individual in a pre-sternway switch circuit, sternway switch, and neutral switch of a work vehicle

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of the 1st or 2nd invention, The pre-sternway change by said advance switch or said sternway switch was constituted so that it could carry out once canceling the sternway selection by said sternway switch, or the advance selection by said advance switch by operating said neutral switch.

[0060]Therefore, since according to the pre-sternway switch circuit of the work vehicle of this 3rd invention a pre-sternway change is not carried out only by pushing an advance switch or a sternway switch but a neutral switch once cancels pre-sternway selection, a shock can be prevented from occurring with a pre-sternway change.

[Translation done.]